



# Installing the GBIC, SFP, and XFP Optics Modules in Cisco ONS Platforms

---

This document provides compatibility information and installation procedures for Gigabit Interface Converter (GBIC), Small Form-factor Pluggable (SFP), and 10 Gbps Small Form-factor Pluggable (XFP) optics modules used with the Cisco ONS 15310-CL, ONS 15310-MA, ONS 15454, ONS 15454 SDH, and ONS 15600 nodes. It also contains removal instructions, cabling, and technical specifications. Use this document in conjunction with platform-specific Cisco user documentation when working with GBICs and SFPs/XFPs or any other system components.

GBICs and SFPs/XFPs are hot-swappable input/output devices that plug into a line card port to link the port with the fiber optic network. For all cards, the type of GBIC or SFP/XFP that is plugged into the card is displayed in Cisco Transport Controller (CTC) and in Transaction Language 1 (TL1).

The sections included in this document are:

- [Compatibility by Card, page 1](#)
- [GBIC Description and Specifications, page 9](#)
- [SFP Description and Specifications, page 14](#)
- [XFP Description and Specifications, page 23](#)
- [GBIC, SFP and XFP Installation and Removal, page 28](#)
- [Related Documentation, page 33](#)
- [Obtaining Documentation, page 33](#)
- [Documentation Feedback, page 34](#)
- [Cisco Product Security Overview, page 35](#)
- [Obtaining Technical Assistance, page 36](#)
- [Obtaining Additional Publications and Information, page 37](#)

## Compatibility by Card

[Table 1](#) lists Cisco ONS 15310-CL, ONS 15310-MA, ONS 15454, ONS 15454 SDH, and ONS 15600 cards with their compatible GBICs, SFPs, and XFPs.



---

**Corporate Headquarters:**  
**Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA**

© 2007 Cisco Systems, Inc. All rights reserved.

**Caution**

Only use GBICs, SFPs, and XFPs certified for use in Cisco Optical Networking Systems. The qualified Cisco GBIC, SFP, and XFP's top assembly numbers (TANs) are provided in [Table 1](#).

**Table 1** *GBIC, SFP, and XFP Card Compatibility*

Platform	Card	Compatible GBIC, SFP or XFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
ONS 15310-CL	15310-CL-CTX	ONS-SI-155-I1= ONS-SI-155-L1= ONS-SI-155-L2= ONS-SI-622-I1= ONS-SI-622-L1= ONS-SI-622-L2=	10-1938-01 10-1957-01 10-1937-01 10-1956-01 10-1958-01 10-1936-01
ONS 15310-MA	CTX2500	<b>155 Mbps SFP Optics</b> ONS-SI-155-I1= ONS-SI-155-L1= ONS-SI-155-L2=  <b>622 Mbps SFP Optics</b> ONS-SI-622-I1= ONS-SI-622-L1= ONS-SI-622-L2=  <b>2.5 Gbps SFP Optics</b> ONS-SI-2G-I1= ONS-SI-2G-L1= ONS-SI-2G-S1= ONS-SI-2G-L2= ONS-SE-Z1=  <b>155 Mbps CWDM<sup>1</sup> SFP Optics</b> ONS-SE-155-1470= through ONS-SE-155-1610=  <b>622 Mbps CWDM SFP Optics</b> ONS-SE-622-1470= through ONS-SE-622-1610=  <b>2.5 Gbps WDM<sup>2</sup> SFP Optics</b> ONS-SC-2G-30.3= through ONS-SC-2G-60.6=	<b>155 Mbps SFP Optics</b> 10-1938-01 10-1957-01 10-1937-01  <b>622 Mbps SFP Optics</b> 10-1956-01 10-1958-01 10-1936-01  <b>2.5 Gbps SFP Optics</b> 10-1993-01 10-2102-01 10-1992-01 10-1990-01 10-1971-01  <b>155 Mbps CWDM SFP Optics</b> 10-1996-01 through 10-2003-01 and 10-1997-01  <b>622 Mbps CWDM SFP Optics</b> 10-2004-01 through 10-2011-01  <b>2.5 Gbps WDM SFP Optics</b> 10-2155-01 through 10-2186-01

**Table 1** GBIC, SFP, and XFP Card Compatibility (continued)

Platform	Card	Compatible GBIC, SFP or XFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
ONS 15454 SONET/SDH	E1000-2-G (ONS 15454 SONET only) E1000-2	15454-GBIC-SX= 15454E-GBIC-SX= 15454-GBIC-LX/LH= 15454E-GBIC-LX/LH= ONS-GC-GE-SX= ONS-GC-GE-LX= ONS-GC-GE-ZX=	30-0759-01 800-06780-01 <sup>3</sup> 10-1743-01 30-0703-01 10-2192-01 10-2191-01 10-2190-01
	G1K-4 <sup>4</sup> G1000-4	15454-GBIC-SX= 15454E-GBIC-SX= 15454-GBIC-LX/LH= 15454E-GBIC-LX/LH= 15454-GBIC-ZX= 15454E-GBIC-ZX= 15454-GBIC-xx.x= <sup>5</sup> 15454E-GBIC-xx.x= <sup>5</sup> 15454-GBIC-xxxx= <sup>6</sup> 15454E-GBIC-xxxx= <sup>6</sup> ONS-GC-GE-SX= ONS-GC-GE-LX= ONS-GC-GE-ZX=	30-0759-01 800-06780-01 10-1743-01 30-0703-01 30-0848-01 10-1744-01 10-1845-01 through 10-1876-01 10-1845-01 through 10-1876-01 10-1453-01 through 10-1460-01 10-1453-01 through 10-1460-01 10-2192-01 10-2191-01 10-2190-01
	ML1000-2	15454-SFP-LC-SX= 15454E-SFP-LC-SX= 15454-SFP-LC-LX= 15454E-SFP-LC-LX= ONS-SC-GE-SX= ONS-SC-GE-LX=	30-1301-01 30-1301-01 30-1299-01 30-1299-01 10-2298-01 10-2301-01
	ML100X-8 CE-100T-8 (ONS 15454 SDH)	ONS-SE-100-FX= ONS-SE-100-LX10=	10-2212-01 10-2213-01
	CE-1000-4	15454-GBIC-SX= 15454-GBIC-LX= 15454-GBIC-ZX= 15454-GBIC-xx.x= <sup>5</sup> 15454E-GBIC-xx.x= <sup>5</sup> 15454-GBIC-xxxx= <sup>5</sup> 15454E-GBIC-xxxx= <sup>6</sup> ONS-GC-GE-SX= ONS-GC-GE-LX= ONS-GC-GE-ZX=	30-0759-01 10-1743-01 30-0848-01 10-1845-01 through 10-1876-01 10-1845-01 through 10-1876-01 10-1453-01 through 10-1460-01 10-1453-01 through 10-1460-01 10-2192-01 10-2191-01 10-2190-01
	ML-MR-10 CE-MR-10	ONS-SE-ZE-EL= ONS-SI-GE-SX ONS-SI-GE-LX ONS-SI-GE-ZX	10-2351-01 10-2295-01 10-2300-01 10-2296-01

**Table 1** *GBIC, SFP, and XFP Card Compatibility (continued)*

<b>Platform</b>	<b>Card</b>	<b>Compatible GBIC, SFP or XFP (Cisco Product ID)</b>	<b>Cisco Top Assembly Number (TAN)</b>
ONS 15454 SONET/SDH (continued)	FC_MR-4	15454-GBIC-SX= 15454E-GBIC-SX= 15454-GBIC-LX/LH= 15454E-GBIC-LX/LH= ONS-GX-2FC-MMI= ONS-GX-2FC-SML=	30-0759-01 800-06780-01 10-1743-01 30-0703-01 10-2015-01 10-2016-01
	MRC-2.5G-4 MRC-12	ONS-SC-2G-30.3= through ONS-SC-2G-60.6= ONS_SE-155-1470= through ONS-SE-155-1610= ONS-SE-622-1470= through ONS-SE-622-1610= ONS-SI-155-I1= ONS-SI-155-L1= ONS-SI-155-L2= ONS-SI-2G-S1= ONS-SI-2G-I1= ONS-SI-2G-L1= ONS-SI-2G-L2= ONS-SI-622-I1= ONS-SI-622-L1= ONS-SI-622-L2= ONS-SI-155-SR-MM= ONS-SI-622-SR-MM= ONS-SC-Z3-1470= ONS-SC-Z3-1490= ONS-SC-Z3-1510= ONS-SC-Z3-1530= ONS-SC-Z3-1550= ONS-SC-Z3-1570= ONS-SC-Z3-1590= ONS-SC-Z3-1610= ONS-SE-Z1= ONS-SC-155-EL	10-2155-01 through 10-2186-01 10-1996-01 through 10-2003-01 and 10-1997-01 10-2004-01 through 10-2011-01 10-1938-01 10-1957-01 10-1937-01 10-1992-01 10-1993-01 10-2102-01 10-1990-01 10-1956-01 10-1958-01 10-1936-01 10-2279-01 10-2280-01 10-2285-01 10-2286-01 10-2287-01 10-2288-01 10-2289-01 10-2290-01 10-2291-01 10-2292-01 10-1971-01 10-2363-01
	OC192SR1/STM64IO Short Reach (This card is designated as OC192-XFP or STM 64 XFP in CTC.)	ONS-XC-10G-S1=	10-2012-01
	OC192/STM64 Any Reach (This card is designated as OC192-XFP or STM 64 XFP in CTC.)	ONS-XC-10G-S1= ONS-XC-10G-I2= ONS-XC-10G-L2= ONS-XC-10G-30.3= through ONS-XC-10G-61.4=	10-2012-01 10-2193-01 10-2194-01 10-2347-01 through 10-2309-01
	MXP_2.5G_10G	15454-SFP-OC48-IR= ONS-SE-2G-S1=	10-1975-01 10-2017-01

**Table 1** GBIC, SFP, and XFP Card Compatibility (continued)

Platform	Card	Compatible GBIC, SFP or XFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
ONS 15454 SONET/SDH (continued)	MXP_2.5G_10E MXP_2.5G_10E_L MXP_2.5G_10E_C	15454-SFP-OC48-IR= ONS-SE-2G-S1= ONS-SE-2G-L2= ONS-SC-2G-30.3= through ONS-SC-2G-60.6= ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-1975-01 10-2017-01 10-2013-01 10-2155-01 through 10-2186-01 10-2285-01 through 10-2292-01
	MXP_MR_2.5G MXPP_MR_2.5G	15454-SFP-GE+-LX= 15454E-SFP-GE+-LX= 15454-SFP-GEFC-SX= 15454E-SFP-GEFC-S= ONS-SE-G2F-SX= ONS-SE-G2F-LX= ONS-SE-200-MM= ONS-SE-GE-ZX= ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-1832-03 10-1832-03 10-1833-02 10-1833-02 10-2272-01 10-2273-01 10-2248-01 10-2354-01 10-2285-01 through 10-2292-01
	TXP_MR_10E TXP_MR_10E_L TXP_MR_10E_C	ONS-XC-10G-S1= ONS-XC-10G-I2= ONS-XC-10G-L2= (Only when placed in Slot 6, 7, 12, or 13.)	10-2012-01 10-2193-01 10-2194-01
	TXP_MR_2.5G TXPP_MR_2.5G	15454-SFP3-1-IR= 15454E-SFP-L.1.1= 15454-SFP12-4-IR= 15454E-SFP-L.4.1= 15454-SFP-OC48-IR= 15454E-SFP-L.16.1= ONS-SE-G2F-SX= ONS-SE-G2F-LX= ONS-SE-200-MM= 15454-SFP-200= 15454E-SFP-200= 15454-SFP-GEFC-SX= 15454E-SFP-GEFC-S= 15454-SFP-GE+-LX= 15454E-SFP-GE+-LX= ONS-SE-GE-ZX= ONS-SI-155-SR-MM= ONS-SC-2G-30.3= through ONS-SC-2G-60.6= ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-1828-01 10-1828-01 10-1976-01 10-1976-01 10-1975-01 10-1975-01 10-2272-01 10-2273-01 10-2248-01 10-1750-01 10-1750-01 10-1833-02 10-1833-02 10-1832-03 10-1832-03 10-2354-01 10-2279-01 10-2155-01 through 10-2186-01 10-2285-01 through 10-2292-01

**Table 1** GBIC, SFP, and XFP Card Compatibility (continued)

Platform	Card	Compatible GBIC, SFP or XFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
ONS 15454 SONET/SDH (continued)	MXP_MR_10DME_C MXP_MR_10DME_L	ONS-SE-4G-MM= ONS-SE-4G-SM= ONS-SE-G2F-LX= ONS-SE-G2F-SX= ONS-SE-ZE-EL= ONS-SI-GE-ZX=	10-2259-01 10-2252-01 10-2273-01 10-2272-01 10-2351-01 10-2296-01
	ADM-10G	ONS-XC-10G-30.3= ONS-XC-10G-31.1= ONS-XC-10G-31.9= ONS-XC-10G-32.6= ONS-XC-10G-33.4= ONS-XC-10G-34.2= ONS-XC-10G-35.0= ONS-XC-10G-35.8= ONS-XC-10G-36.6= ONS-XC-10G-37.4= ONS-XC-10G-38.1= ONS-XC-10G-38.9= ONS-XC-10G-39.7= ONS-XC-10G-40.5= ONS-XC-10G-41.3= ONS-XC-10G-42.1= ONS-XC-10G-42.9= ONS-XC-10G-43.7= ONS-XC-10G-44.5= ONS-XC-10G-45.3= ONS-XC-10G-46.1= ONS-XC-10G-46.9= ONS-XC-10G-47.7= ONS-XC-10G-48.5= ONS-XC-10G-49.3= ONS-XC-10G-50.1= ONS-XC-10G-50.9= ONS-XC-10G-51.7= ONS-XC-10G-52.5= ONS-XC-10G-53.3= ONS-XC-10G-54.1= ONS-XC-10G-54.9= ONS-XC-10G-55.7= ONS-XC-10G-56.5= ONS-XC-10G-57.3= ONS-XC-10G-58.1= ONS-XC-10G-58.9= ONS-XC-10G-59.7= ONS-XC-10G-60.6= ONS-XC-10G-61.4=	10-2347-01 10-2346-01 10-2344-01 10-2345-01 10-2343-01 10-2342-01 10-2341-01 10-2340-01 10-2339-01 10-2338-01 10-2337-01 10-2336-01 10-2335-01 10-2348-01 10-2334-01 10-2333-01 10-2332-01 10-2331-01 10-2330-01 10-2329-01 10-2328-01 10-2327-01 10-2326-01 10-2325-01 10-2324-01 10-2323-01 10-2322-01 10-2321-01 10-2320-01 10-2319-01 10-2318-01 10-2317-01 10-2316-01 10-2315-01 10-2314-01 10-2313-01 10-2312-01 10-2311-01 10-2310-01 10-2309-01

**Table 1** GBIC, SFP, and XFP Card Compatibility (continued)

Platform	Card	Compatible GBIC, SFP or XFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
ONS 15454 SONET/SDH (continued)	ADM-10G	ONS-XC-10G-S1= ONS-SE-G2F-LX= ONS-SE-G2F-SX= ONS-SI-GE-ZX= ONS-SI-155-L2= ONS-SI-2G-S1= ONS-SI-2G-I1= ONS-SI-2G-L2= ONS-SI-622-I1= ONS-SE-Z1= ONS-SC-2G-30.3= through ONS-SC-2G-60.6= ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2012-02 10-2273-01 10-2272-01 10-2296-01 10-1937-01 10-1992-01 10-1993-01 10-1990-01 10-1956-01 10-1971-01 10-2155-01 through 10-2186-01 10-2285-01 through 10-2292-01
	10GE_XP	ONS-XC-10G-30.3= ONS-XC-10G-31.1= ONS-XC-10G-31.9= ONS-XC-10G-32.6= ONS-XC-10G-33.4= ONS-XC-10G-34.2= ONS-XC-10G-35.0= ONS-XC-10G-35.8= ONS-XC-10G-36.6= ONS-XC-10G-37.4= ONS-XC-10G-38.1= ONS-XC-10G-38.9= ONS-XC-10G-39.7= ONS-XC-10G-40.5= ONS-XC-10G-41.3= ONS-XC-10G-42.1= ONS-XC-10G-42.9= ONS-XC-10G-43.7= ONS-XC-10G-44.5= ONS-XC-10G-45.3= ONS-XC-10G-46.1= ONS-XC-10G-46.9= ONS-XC-10G-47.7= ONS-XC-10G-48.5= ONS-XC-10G-49.3= ONS-XC-10G-50.1= ONS-XC-10G-50.9= ONS-XC-10G-51.7= ONS-XC-10G-52.5= ONS-XC-10G-53.3= ONS-XC-10G-54.1= ONS-XC-10G-54.9= ONS-XC-10G-55.7=	10-2347-01 10-2346-01 10-2344-01 10-2345-01 10-2343-01 10-2342-01 10-2341-01 10-2340-01 10-2339-01 10-2338-01 10-2337-01 10-2336-01 10-2335-01 10-2348-01 10-2334-01 10-2333-01 10-2332-01 10-2331-01 10-2330-01 10-2329-01 10-2328-01 10-2327-01 10-2326-01 10-2325-01 10-2324-01 10-2323-01 10-2322-01 10-2321-01 10-2320-01 10-2319-01 10-2318-01 10-2317-01 10-2316-01

**Table 1** *GBIC, SFP, and XFP Card Compatibility (continued)*

<b>Platform</b>	<b>Card</b>	<b>Compatible GBIC, SFP or XFP (Cisco Product ID)</b>	<b>Cisco Top Assembly Number (TAN)</b>
ONS 15454 SONET/SDH (continued)	10GE_XP	ONS-XC-10G-56.5= ONS-XC-10G-57.3= ONS-XC-10G-58.1= ONS-XC-10G-58.9= ONS-XC-10G-59.7= ONS-XC-10G-60.6= ONS-XC-10G-61.4= ONS-XC-10G-S1= ONS-XC-10G-I2=	10-2315-01 10-2314-01 10-2313-01 10-2312-01 10-2311-01 10-2310-01 10-2309-01 10-2012-02 10-2193-01
	GE_XP	ONS-XC-10G-30.3= ONS-XC-10G-31.1= ONS-XC-10G-31.9= ONS-XC-10G-32.6= ONS-XC-10G-33.4= ONS-XC-10G-34.2= ONS-XC-10G-35.0= ONS-XC-10G-35.8= ONS-XC-10G-36.6= ONS-XC-10G-37.4= ONS-XC-10G-38.1= ONS-XC-10G-38.9= ONS-XC-10G-39.7= ONS-XC-10G-40.5= ONS-XC-10G-41.3= ONS-XC-10G-42.1= ONS-XC-10G-42.9= ONS-XC-10G-43.7= ONS-XC-10G-44.5= ONS-XC-10G-45.3= ONS-XC-10G-46.1= ONS-XC-10G-46.9= ONS-XC-10G-47.7= ONS-XC-10G-48.5= ONS-XC-10G-49.3= ONS-XC-10G-50.1= ONS-XC-10G-50.9= ONS-XC-10G-51.7= ONS-XC-10G-52.5= ONS-XC-10G-53.3= ONS-XC-10G-54.1= ONS-XC-10G-54.9= ONS-XC-10G-55.7= ONS-XC-10G-56.5= ONS-XC-10G-57.3= ONS-XC-10G-58.1= ONS-XC-10G-58.9= ONS-XC-10G-59.7=	10-2347-01 10-2346-01 10-2344-01 10-2345-01 10-2343-01 10-2342-01 10-2341-01 10-2340-01 10-2339-01 10-2338-01 10-2337-01 10-2336-01 10-2335-01 10-2348-01 10-2334-01 10-2333-01 10-2332-01 10-2331-01 10-2330-01 10-2329-01 10-2328-01 10-2327-01 10-2326-01 10-2325-01 10-2324-01 10-2323-01 10-2322-01 10-2321-01 10-2320-01 10-2319-01 10-2318-01 10-2317-01 10-2316-01 10-2315-01 10-2314-01 10-2313-01 10-2312-01 10-2311-01



**Table 1** GBIC, SFP, and XFP Card Compatibility (continued)

Platform	Card	Compatible GBIC, SFP or XFP (Cisco Product ID)	Cisco Top Assembly Number (TAN)
ONS 15454 SONET/SDH (continued)	GE_XP	ONS-XC-10G-60.6= ONS-XC-10G-61.4= ONS-XC-10G-S1= ONS-XC-10G-I2= ONS-SE-G2F-LX= ONS-SE-G2F-SX= ONS-SI-GE-ZX= ONS-SE-ZE-EL= ONS-SC-2G-30.3= through ONS-SC-2G-60.6= ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	10-2310-01 10-2309-01 10-2012-02 10-2193-01 10-2273-01 10-2272-01 10-2296-01 10-2351-01 10-2155-01 through 10-2186-01 10-2285-01 through 10-2292-01
ONS 15600	ASAP	ONS-SE-2G-L2= ONS-SE-Z1= ONS-SI-622-L2= ONS-SI-155-L2= ONS-SC-2G-46.1= through ONS-SC-2G-60.6= ONS-SC-2G-30.3= through ONS-SC-2G-44.5= ONS-SI-2G-S1 ONS-XC-10G-30.3= through ONS-XC-10G-61.4= ONS-XC-10G-I2=	10-2013-01 10-1971-01 10-1936-01 10-1937-01 10-2170-01 through 10-2184-01, and 10-2186-01 10-2155-01 through 10-2169-01, and 10-2185-01 10-1992-01 10-2347-01 through 10-2309-01 10-2193-01

1. CWDM = coarse wavelength division multiplexing.
2. WDM = wavelength division multiplexing.
3. This TAN is only compatible with ONS 15454 E1000-2 or 15454 E1000-2-G cards.
4. G1000-4 cards support CWDM and dense wavelength division multiplexing (DWDM) GBICs. G1K-4 cards with the Common Language Equipment Identification (CLEI) code of WM5IRWPCAA (manufactured after August 2003) support CWDM and DWDM GBICs. G1K-4 cards manufactured prior to August 2003 do not support CWDM or DWDM GBICs.
5. xx.x defines the 32 possible wavelengths as shown in [Table 6 on page 13](#). For example, a 1530.33 nm DWDM wavelength is represented as 30.3.
6. xxxx defines the 8 possible wavelengths as shown in [Table 5 on page 12](#). For example, a 1470 nm CWDM wavelength is represented as 1470.

## GBIC Description and Specifications

GBICs are integrated fiber-optic transceivers that provide high speed serial links from a port or slot to the network. Various latching mechanisms can be utilized on the GBICs. There is no correlation between the type of latch and the model type (such as SX or LX/LH) or technology type (such as Gigabit Ethernet). See the label on the GBIC for technology type and model. One GBIC model has two clips (one on each side of the GBIC) that secure the GBIC in the slot on the Ethernet card; the other has a locking handle. Both types are shown in [Figure 1](#).

GBIC dimensions are:

- Height 0.39 inches (1 cm)
- Width 1.18 inches (3 cm)
- Depth 2.56 inches (6.5 cm)

GBIC temperature ranges are:

- COM—Commercial operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (–5 degrees Celsius to 70 degrees Celsius)
- EXT—Extended operating temperature range between 23 degrees Fahrenheit it to 185 degrees Fahrenheit (–5 degrees Celsius to 85 degrees Celsius)
- IND—Industrial operating temperature range between –40 degrees Fahrenheit to 185 degrees Fahrenheit (–40 degrees Celsius to 85 degrees Celsius)



**Caution**

Do not add labels or markings to the GBICs.

**Figure 1** GBICs with Clips (Left) and with a Handle (Right)

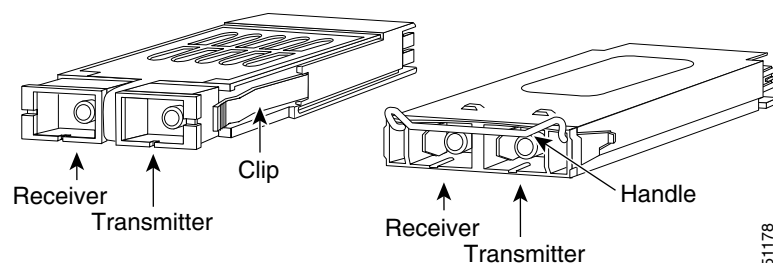


Table 2 lists specifications for available GBICs (non-DWDM/CWDM). See the “[DWDM and CWDM GBICs](#)” section on page 12 for descriptions and specifications for DWDM and CWDM GBICs.

**Table 2** GBIC Specifications

GBIC	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
15454-GC-GE-SX= Short Reach	Gigabit Ethernet Fibre Channel, 1 Gbps	–9.5 to –4	–17 to 0
15454-GC-GE-LX= Long Reach	Gigabit Ethernet Fibre Channel, 1 Gbps	–9.5 to –3	–19 to –3
15454-GC-GE-ZX= Extended Reach	Gigabit Ethernet	0 to 5	–23 to –3
15454-GBIC-xx.x= <sup>1</sup> 15454E-GBIC-xx.x= DWDM	Gigabit Ethernet	–0 to +3	–28 to –7
15454-GBIC-xxxx= <sup>1</sup> 15454E-GBIC-xxxx= CWDM	Gigabit Ethernet	+1 to +5	–29 to –7
15454-GBIC-LX=/ 15454E-GBIC-LX=	1000Base-LX, SC, SM, or MM	–9.5 to –3	–19 to –3
15454-GBIC-SX=/ 15454E-GBIC-SX=	1000Base-SX, SC, or MM	–9.5 to 0	–17 to –0
15454-GBIC-LX/LH= 15454E-GBIC-LX/LH=	1000Base-LX, SC, SM, or MM	–9.5 to –3	–19 to –3

**Table 2** *GBIC Specifications (continued)*

GBIC	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
15454-GBIC-ZX= 15454E-GBIC-ZX=	1000Base-ZX, SM	-5 to 0	-23 to -3
ONS-GX-2FC-MMI= Short Reach	Fibre Channel, 1 or 2 Gbps	-9.5 to -5	-17 to 0
ONS-GX-2FC-SML= Long Reach	Fibre Channel, 1 or 2 Gbps	-9 to -3	-18 to -3

- Operating temperature range for a card with CWDM/DWDM GBICs installed is limited to -5 to +40 degrees Celsius. Operation with CWDM/DWDM GBICs requires R4.1 or later version G1K-4 hardware, CLEI Code WM51RWPCAA.

## GBIC Port Cabling Specifications

[Table 3](#) provides cabling specifications for single-mode fiber (SMF) GBICs and [Table 4](#) provides cabling specifications for multimode fiber (MMF) GBICs that you install into Ethernet cards. All GBIC ports have SC-type connectors and the minimum cable distance for all GBICs listed is 6.5 feet (2 m).

**Table 3** *Single-Mode Fiber GBIC Port Cabling Specifications*

GBIC	Wavelength	Fiber Type	Cable Distance
15454-GBIC-xx.x= 15454E-GBIC-xx.x= DWDM	See <a href="#">Table 6 on page 13</a>	9 micron SMF	100 to 120 km (unamplified) (62 to 74.5 miles) Up to 300 km (amplified) (Up to 186.4 miles)
15454-GBIC-xxxx= 15454E-GBIC-xxxx= CWDM	See <a href="#">Table 5 on page 12</a>	9 micron SMF	100 to 120 km (62 to 74.5 miles)
15454-GC-GE-LX= Long Reach	1310 nm	9 micron SMF	10 km (6.2 miles)
		50.0 micron SMF	550 m (1804 ft)
		62.5 micron SMF	275 m (902.2 ft)
15454-GC-GE-ZX= <sup>1</sup> Extended Reach	1550 nm <sup>2</sup>	9 micron SMF	70 to 100 km <sup>3</sup> (43.4 to 62 miles)
ONS-GX-2FC-SML= Long Reach	1310 nm <sup>4</sup>	9 micron SMF	10 km (6.2 miles)

- The 15454-GC-GE-ZX operates on SMF optic link spans of up to 49.7 miles (80 km) in length. Link spans of up to 62.1 miles (100 km) are possible using premium SMF or dispersion shifted SMF. When shorter distances of SMF are used, it might be necessary to insert an in-line optical attenuator in the link, to avoid overloading the receiver. For fiber-optic cable spans less than 15.5 miles (25 km), insert a 10 dB in-line optical attenuator between the fiber-optic cable plant and the receiving port on the 15454-GC-GE-ZX at each end of the link. For fiber-optic cable spans equal to or greater than 15.5 miles (25 km) and less than 31 miles (50 km), insert a 5 dB in-line optical attenuator between the fiber-optic cable plant and the receiving port on the 15454-GC-GE-ZX at the end of the link.
- Typical loss on a 1550 nm wavelength SMF is 0.3 dB/km.
- 62.1 miles (100 km) cable distance requires dispersion-shifted SMF (15454-GC-GE-ZX).
- Typical loss on a 1310 nm wavelength SMF is 0.5 dB/km.

**Table 4** *Multimode Fiber GBIC Port Cabling Specifications*

GBIC	Wavelength	Fiber Type <sup>1</sup>	Cable Distance
15454-GC-GE-SX= Short Reach	850 nm	62.5 micron MMF	220 m (722 ft)
			275 m (902 ft)
		50.0 micron MMF	500 m (1640 ft)
			550 m (1804 ft)
15454-GC-GE-LX= Long Reach	1310 nm	62.5 micron MMF <sup>2</sup>	550 m (1804 ft)
		50.0 micron MMF	550 m (1804 ft)
ONS-GX-2FC-MMI= Short Reach	850 nm	50.0 micron MMF	550 m (1804 ft)
		62.5 micron MMF	300 m (984.3 ft)

1. The numbers given for MMF refer to the core diameter. For SMF, 8.3 micron refers to the core diameter. The 9-micron and 10-micron values refer to the mode-field diameter (MFD), which is the diameter of the light-carrying portion of the fiber. This area consists of the fiber core and a small portion of the surrounding cladding. The MFD is a function of the core diameter, the wavelength of the laser, and the refractive index difference between the core and the cladding.
2. When using an LX/LH GBIC with 62.5-micron diameter MMF, you must install a mode-conditioning patchcord (CAB-GELX-625 or equivalent) between the GBIC and the MMF cable on both the transmit and receive ends of the link. The mode-conditioning patchcord is required for link distances less than 328 feet (100 m) or greater than 984 feet (300 m). The mode-conditioning patchcord prevents overdriving the receiver for short lengths of MMF and reduces differential mode delay for long lengths of MMF.

## DWDM and CWDM GBICs

DWDM GBICs (15454-GBIC-xx.x and 15454E-GBIC-xx.x) and CWDM GBICs (15454-GBIC-xxxx and 15454E-GBIC-xxxx) are both WDM technologies that operate over single-mode fibers with SC (subscription channel) connectors. Cisco CWDM GBIC technology uses a 20-nm wavelength grid and Cisco ONS 15454 DWDM GBIC technology uses a 0.8-nm wavelength grid. CTC displays the specific wavelengths of the installed CWDM or DWDM GBICs. DWDM wavelengths are spaced closer together and require more precise lasers than the CWDM. The DWDM spectrum allows for optical signal amplification.

The ONS 15454 SONET/SDH-supported CWDM GBICs reach up to 100 to 120 km over single-mode fiber and can support eight wavelengths as shown in [Table 5](#).

**Table 5** *Supported Wavelengths for CWDM GBICs*

CWDM GBIC Wavelengths	1470 nm	1490 nm	1510 nm	1530 nm	1550 nm	1570 nm	1590 nm	1610 nm
Corresponding GBIC Colors	Gray	Violet	Blue	Green	Yellow	Orange	Red	Brown
Band	47	49	51	53	55	57	59	61

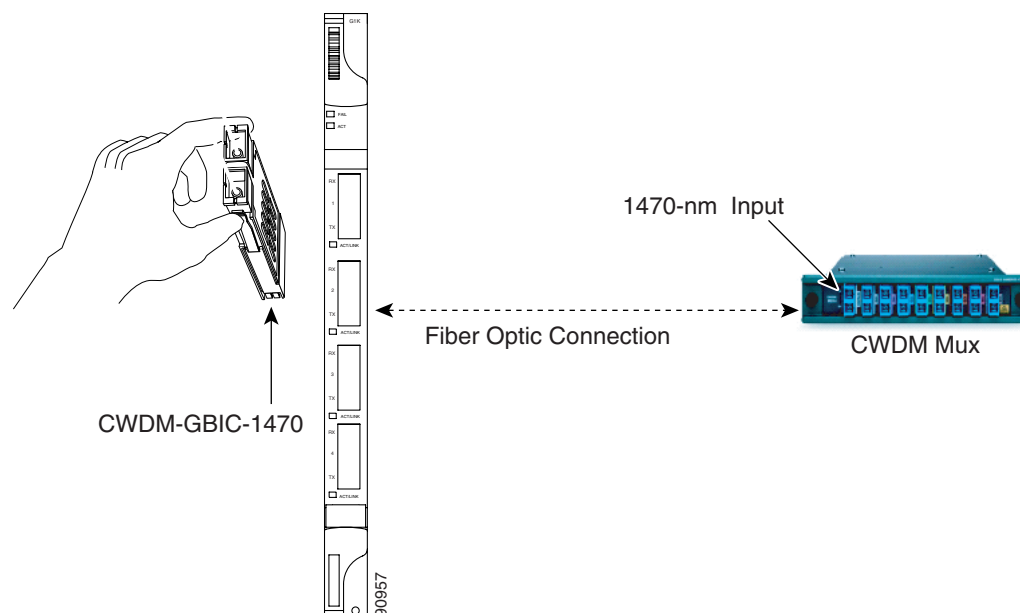
The ONS 15454 SONET/SDH-supported DWDM GBICs reach up to 100 to 120 km over single-mode fiber and can support 32 different wavelengths at 100-GHz spacing in the C band. These wavelengths are compatible with Cisco DWDM filters, such as ONS 15454 MSTP and ONS 15216 FlexLayer. Paired with optical amplifiers, such as the Cisco ONS 15216 EDFA3, the DWDM GBICs allow maximum unregenerated spans of approximately 186.3 miles (300 km) ([Table 6](#)).

**Table 6**      **Supported Wavelengths for DWDM GBICs**

<b>Blue Band</b>	1530.33 nm	1531.12 nm	1531.90 nm	1532.68 nm	1534.25 nm	1535.04 nm	1535.82 nm	1536.61 nm
	1538.19 nm	1538.98 nm	1539.77 nm	1540.56 nm	1542.14 nm	1542.94 nm	1543.73 nm	1544.53 nm
<b>Red Band</b>	1546.12 nm	1546.92 nm	1547.72 nm	1548.51 nm	1550.12 nm	1550.92 nm	1551.72 nm	1552.52 nm
	1554.13 nm	1554.94 nm	1555.75 nm	1556.55 nm	1558.17 nm	1558.98 nm	1559.79 nm	1560.61 nm

## Placement of CWDM or DWDM GBICs

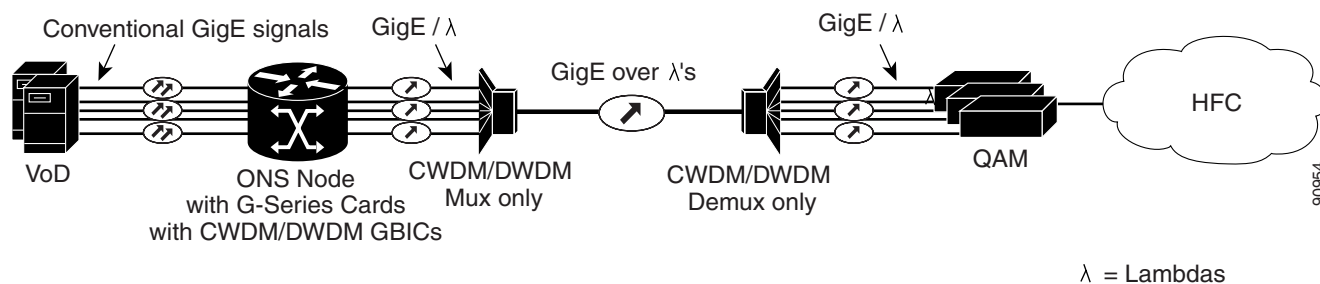
CWDM or DWDM GBICs come in set wavelengths and are not provisionable. The wavelengths are printed on each GBIC, for example, CWDM-GBIC-1490. The user must insert the specific GBIC transmitting the wavelength required to match the input of the CWDM/DWDM device for successful operation (Figure 2). Follow your site plan or network diagram for the required wavelengths.

**Figure 2**      **CWDM GBIC with Wavelength Appropriate for Fiber-Connected Device**

The *Cisco ONS 15454 Procedure Guide* contains specific procedures for attaching optical fiber to GBICs and inserting GBICs into the applicable card.

## Example of CWDM or DWDM GBIC Application

A G-Series card equipped with CWDM or DWDM GBICs supports the delivery of unprotected Gigabit Ethernet service in Metro DWDM applications (Figure 3). It can be used in short-haul and long-haul applications.

**Figure 3** *G-Series with CWDM/DWDM GBICs in Cable Network*

## SFP Description and Specifications

SFPs are integrated fiber optic transceivers that provide high speed serial links from a port or slot to the network. Various latching mechanisms can be utilized on the SFPs. There is no correlation between the type of latch and the model type (such as SX or LX/LH) or technology type (such as Gigabit Ethernet). See the label on the SFP for technology type and model. One type of latch available is a mylar tab as shown in [Figure 4](#), a second type of latch available is an actuator/button ([Figure 5](#)), and the third type of latch is a bail clasp ([Figure 6](#) and [Figure 7](#)).

SFP dimensions are:

- Height 0.03 inches (8.5 mm)
- Width 0.53 inches (13.4 mm)
- Depth 2.22 inches (56.5 mm)

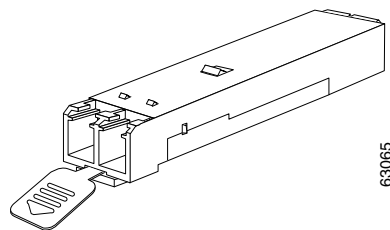
SFP temperature ranges are:

- COM—Commercial operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (–5 degrees Celsius to 70 degrees Celsius)
- EXT—Extended operating temperature range between 23 degrees Fahrenheit to 185 degrees Fahrenheit (–5 degrees Celsius to 85 degrees Celsius)
- IND—Industrial operating temperature range between –40 degrees Fahrenheit to 185 degrees Fahrenheit (–40 degrees Celsius to 85 degrees Celsius)



**Caution**

Do not add labels or markings to the SFPs.

**Figure 4** *Mylar Tab SFP*

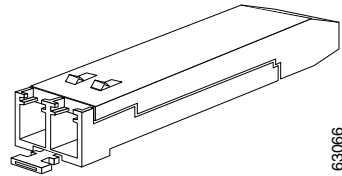
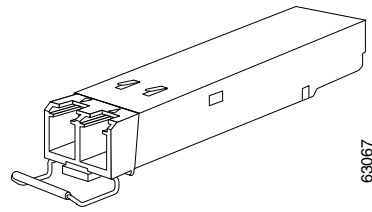
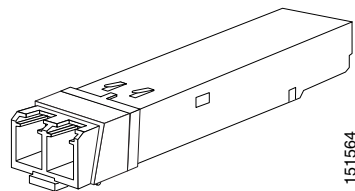
**Figure 5 Actuator/Button SFP****Figure 6 Bail Clasp SFP****Figure 7 Wide Bail Clasp SFP**

Table 7 lists specifications for available SFPs.

**Table 7 SFP Specifications**

<b>SFP</b>	<b>Interface</b>	<b>Transmitter Output Power Min/Max (dBm)</b>	<b>Receiver Input Power Min/Max (dBm)</b>
ONS-SC-2G-30.3= through ONS-SC-2G-60.6=	OC-48, STM-16	0 to +4	-28 to -9
ONS-SE-100-FX=	100 Mbps long reach - 1310 nm - SM - LC, EXT-TEMP	-20 to -14 <sup>1</sup>	-31 to -14
ONS-SE-100-LX10=	100 Mbps long reach - 1310 nm - MM - LC, EXT-TEMP	-15 to -8	-28 to -8
ONS-SE-155-1470= through ONS-SE-155-1610=	OC-3, STM-1	0 to +5	-34 to -7
ONS-SE-4G-MM=	4G FC/Ficon	-9 to -2.5	-15

**Table 7**      **SFP Specifications (continued)**

<b>SFP</b>	<b>Interface</b>	<b>Transmitter Output Power Min/Max (dBm)</b>	<b>Receiver Input Power Min/Max (dBm)</b>
ONS-SE-4G-SM=	4G FC/Ficon	290 microwatts OMA <sup>2</sup>	29 microwatts OMA <sup>3</sup>
ONS-SE-622-1470= through ONS-SE-622-1610=	OC-3, STM-1	0 to +5	–28 to –7
ONS-SE-2G-30.3= through ONS-SE-2G-60.6=	OC-48, STM-16	0 to +4	–28 to –9 <sup>4</sup> –22 to –9 <sup>5</sup>
ONS-SE-2G-L2=	OC-48, STM-16	–2.0 to 3.0	–28 to –9
ONS-SE-2G-S1=	OC-48, STM-16	–10 to –3	–18 to –3
ONS-SE-Z1=	OC-3, OC-12, OC48, STM-1, STM-4, STM-16	–5.0 to 0	–23 to –3 (155.52/ 622.08 Mbps) –19 to –3 (1250 Mbps) –18 to 0 (2488.32 Mbps)
ONS-SI-155-I1=	OC-3, STM-1	–15 to –8.0	–28 to –8
ONS-SI-155-L1=	OC-3, STM-1	–5.0 to 0	–34 to –10
ONS-SI-155-L2=	OC-3, STM-1	–5.0 to 0	–34 to –10
ONS-SI-2G-I1=	OC-48, STM-16	–5.0 to 0	–18 to –0
ONS-SI-2G-L1=	OC-48, STM-16	–2 to +3	–27 to –9
ONS-SI-2G-L2=	OC-48, STM-16	–2 to +3	–28 to –9
ONS-SI-2G-S1=	OC-48, STM-16	–10 to –3	–18 to –3
ONS-SI-622-I1=	OC-12, OC-3, STM-4, STM-1	–15 to –8.0	–28 to –8
ONS-SI-622-L1=	OC-12, STM-4	–3.0 to 2.0	–28 to –8
ONS-SI-622-L2=	OC-12, STM-4	–3.0 to 2.0	–28 to –8
15454-SFP-LC-SX=/ 15454E-SFP-LC-SX=/ ONS-SC-GE-SX=	Gigabit Ethernet	–9.5 to –4	–17 to 0
15454-SFP-LC-LX=/ 15454E-SFP-LC-LX=/ ONS-SC-GE-LX=	Gigabit Ethernet	–9.5 to –3	–19 to –3
15454-SFP3-1-IR=	OC-3	–15 to –8	–28 to –8
15454E-SFP-L.1.1=	STM-1	–15 to –8	–34 to –10
15454-SFP12-4-IR=	OC-12, D1 Video	–15 to –8	–28 to –7
15454E-SFP-L.4.1=	STM-4, D1 Video	–15 to –8	–28 to –8
15454-SFP-OC48-IR=	OC-48, DV6000 (C-Cor)	–5 to +0	–18 to +0
15454E-SFP-L.16.1=	STM-16, DV6000 (C-Cor)	–5 to +0	–18 to +0



**Table 7** *SFP Specifications (continued)*

<b>SFP</b>	<b>Interface</b>	<b>Transmitter Output Power Min/Max (dBm)</b>	<b>Receiver Input Power Min/Max (dBm)</b>
15454-SFP-200=/ 15454E-SFP-200=	ESCON <sup>6</sup>	-20.5 to -15	-29 to -14
15454-SFP-GEFC-SX=/ 15454E-SFP-GEFC-S=/ ONS-SE-G2F-SX=	Fibre Channel (1 and 2 Gbps), FICON <sup>7</sup> , GE <sup>8</sup>	-10 to -3.5	-17 to 0 for 1FC GE -15 for 2FC
15454-SFP-GE+-LX=/ 15454E-SFP-GE+-LX=/ ONS-SE-G2F-LX	Fibre Channel (1 and 2 Gbps), FICON, GE, HDTV <sup>9</sup>	-9.5 to -3.0	-20 to -3 for 1FC, 2FC, and GE
ONS-SI-155-SR-MM=	OC-3, STM-1	-19 to -14	-14 to -5
ONS-SI-622-SR-MM=	OC-12, STM-4	-19 to -14	-14 to -5
ONS-SC-Z3-1470= through ONS-SC-Z3-1610=	OC48/STM16/GE	0 to +5	-9 (min)
ONS-SE-Z1=	OC-3/STM1 OC-12/STM-4 OC-48/STM-16 Fibre Channel (1 and 2 Gbps) GE	-5 to 0	-10 to -23 (OC-3) 0 to -23 (OC-12) -18 to 0 (OC-48) 0 to -21 (Fibre Channel) 0 to -22 (GE)
ONS-SI-2G-S1	OC-48/STM-16	-10 to -3	-3 (min)
ONS-SE-155-1470 through ONS-SE-155-1610	OC-3/STM-1	0 to 5	-7 to 0
ONS-SE-622-1470 through ONS-SE-622-1610	OC-12/STM-4	0 to 5	-7 to 0
ONS-SI-GE-ZX	Gigabit Ethernet	0 to +5	-23 to -3
ONS-SE-GE-ZX	Gigabit Ethernet	0 to +5	-23 to -3
ONS-SE-ZE-EL	1000 Base-T Ethernet	NA	NA

1. 62.5/125 microns, NA = 0.275 fiber

2. Specified OMA at 4.25 GB/s is equal to an average power of -7.3 dBm at an ER of 9 dB.

3. Specified OMA at 4.25 GB/s is equal to an average power of -17.3 dBm at an ER of 9 dB.

4. Power limited performance at BER=10e-12 with SONET framed PRBS23, optical signal-to-noise ratio (OSNR) of 21 dB, 0.1 nm bandwidth (BW)

5. Power limited performance at BER=10e-12 with SONET framed PRBS23, OSNR of 16 dB, 0.1 nm BW

6. Enterprise System Connection

7. Fiber connectivity

8. Gigabit Ethernet

9. High-definition television

**Table 8** SFP Dispersion Tolerance

Performance Limits	Input Power Range (dBm)	Dispersion Tolerance (ps/nm)	Penalty (dB)	OSNR
Power Limited Performance	-28 to -9	-800 to +2400	Power Penalty: 3 Noise Penalty: 0	Optical signal to noise ratio (OSNR) = 21 dB at 0.1 nm BW
Noise Limited Performance	-22 to -9	-800 to +2400	Noise Penalty: 3 Power Penalty: 0	OSNR = 19 dB at 0.1 nm BW

## SFP Port Cabling Specifications

Table 9 provides cabling specifications for the SMF SFPs and Table 10 provides cabling specifications for MMF SFPs that you install into interface cards. The ports of the listed SFPs have LC-type connectors.



### Note

If you are using Software R6.2, the following list of platforms, cards, and PPMs are not supported: ONS15310-MA platform and related PPMs, CE1000-4 card and related PPMs, the ONS-XC-10G-L2= PPM, MXP\_2.5G\_10E\_L, MXP\_2.5G\_10E\_C, TXP\_MR\_10E\_L, TXP\_MR\_10E\_C, MXP\_MR\_10DME\_C, and the MXP\_MR\_10DME\_L cards. The ONS-SE-200-MM= PPM is not supported on the MXP\_MR\_2.5G and MXPP\_MR\_2.5G cards.

**Table 9** Single-Mode Fiber SFP Port Cabling Specifications

SFP	Transmit Wavelength <sup>1</sup>	Fiber Type	Cable Distance
ONS-SC-2G-30.3=	1530.33 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-31.1=	1531.12 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-31.9=	1531.90 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-32.6=	1532.68 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-34.2=	1534.25 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-35.0=	1535.04 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-35.8=	1535.82 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-36.6=	1536.61 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-38.1=	1538.19 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-38.9=	1538.98 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-39.7=	1539.77 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-40.5=	1540.56 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-42.1=	1542.14 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-42.9=	1542.94 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-43.7=	1543.73 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-44.5=	1544.53 nm	9 micron SMF	N/A <sup>2</sup>

**Table 9** *Single-Mode Fiber SFP Port Cabling Specifications (continued)*

<b>SFP</b>	<b>Transmit Wavelength<sup>1</sup></b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-SC-2G-46.1=	1546.12 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-46.9=	1546.92 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-47.7=	1547.72 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-48.5=	1548.51 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-50.1=	1550.12 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-50.9=	1550.92 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-51.7=	1551.72 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-52.5=	1552.52 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-54.1=	1554.13 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-54.9=	1554.94 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-55.7=	1555.75 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-56.5=	1556.55 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-58.1=	1558.17 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-58.9=	1558.98 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-59.7=	1559.79 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SC-2G-60.6=	1560.61 nm	9 micron SMF	N/A <sup>2</sup>
ONS-SE-155-1470=	1470 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1490=	1490 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1510=	1510 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1530=	1530 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1550=	1550 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1570=	1570 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1590	1590 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-155-1610=	1610 nm	9 micron SMF	120 km (74.56 miles)
ONS-SE-4G-SM=	1270 – 1355 nm	9 micron SMF	10 km (6.2 miles)
ONS-SE-622-1470=	1470 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1490=	1490 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1510=	1510 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1530=	1530 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1550=	1550 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1570=	1570 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1590=	1590 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-622-1610=	1610 nm	9 micron SMF	100 km (62.14 miles)
ONS-SE-2G-L2=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-2G-S1= Short Reach	1310 nm	9 micron SMF	2 km (1.2 miles)

**Table 9**      **Single-Mode Fiber SFP Port Cabling Specifications (continued)**

<b>SFP</b>	<b>Transmit Wavelength<sup>1</sup></b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-SE-Z1=	1310 nm	9 micron SMF	15 km (9.3 miles)
ONS-SI-155-I1= Intermediate Reach	1310 nm	9 micron SMF	21 km (13.05 miles)
ONS-SI-155-L1= Long Reach	1310 nm	9 micron SMF	50 km (31.07 miles)
ONS-SI-155-L2= Long Reach	1550 nm	9 micron SMF	100 km (62.14 miles)
ONS-SI-2G-I1=	1310 nm	9 micron SMF	15 km (9.3 miles)
ONS-SI-2G-L1=	1310 nm	9 micron SMF	40 km (25.80 miles)
ONS-SI-2G-L2=	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SI-2G-S1=	1310 nm	9 micron SMF	2 km (1.2 miles)
ONS-SI-622-I1= Intermediate Reach	1310 nm	9 micron SMF	21 km (13.05 miles)
ONS-SI-622-L1= Long Reach	1310 nm	9 micron SMF	42 km (26.10 miles)
ONS-SI-622-L2= Long Reach	1550 nm	9 micron SMF	85 km (52.82 miles)
15454-SFP-LC-LX=/ 15454E-SFP-LC-LX=/ ONS-SC-GE-LX Long Reach	1310 nm	9 micron SMF	10 km (6.2 miles)
15454-SFP3-1-IR= Intermediate Reach	1310 nm	9 micron SMF	15 km (9.3 miles)
15454E-SFP-L.1.1= Short Haul	1310 nm	9 micron SMF	15 km (9.3 miles)
15454-SFP12-4-IR= Intermediate Reach	1310 nm	9 micron SMF	15 km (9.3 miles)
15600-SFP-12-4-LR2=	1530 nm	9 micron SMF	80 km (49.71 miles)
15454E-SFP-L.4.1= Short Haul	1310 nm	9 micron SMF	15 km (9.3 miles)
15454-SFP-OC48-IR= Intermediate Reach	1310 nm	9 micron SMF	15 km (9.3 miles)
15454E-SFP-L.16.1= Short Haul	1310 nm	9 micron SMF	15 km (9.3 miles)
15454-SFP-GE+-LX=/ 15454E-SFP-GE+-LX= Long Reach	1310 nm	9 micron SMF	10 km (6.2 miles) for FC 1G, FC 2G and GE 5 km (3.1 miles) for HDTV
ONS-SC-Z3-1470= Long Reach	1470 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1490= Long Reach	1490 nm	9 micron SMF	80 km (49.71 miles)

**Table 9**      **Single-Mode Fiber SFP Port Cabling Specifications (continued)**

<b>SFP</b>	<b>Transmit Wavelength<sup>1</sup></b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-SC-Z3-1510= Long Reach	1510 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1530= Long Reach	1530 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1550= Long Reach	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1570= Long Reach	1570 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1590= Long Reach	1590 nm	9 micron SMF	80 km (49.71 miles)
ONS-SC-Z3-1610= Long Reach	1610 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-Z1= Intermediate Reach	1310 nm	9 micron SMF	30 km (18.6 miles) for OC-3/STM1, OC-12/STM-4, OC-48/STM-16, and Fibre Channel (1 and 2 Gbps)  20 km (12.4 miles) for GE
ONS-SI-2G-S1 Short Reach	1310 nm	9 micron SMF	2 km (1.2 miles)
ONS-SE-155-1470 Long Reach	1470 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1490 Long Reach	1490 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1510 Long Reach	1510 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1530 Long Reach	1530 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1550 Long Reach	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1570 Long Reach	1570 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1590 Long Reach	1590 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-155-1610 Long Reach	1610 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1470 Long Reach	1470 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1490 Long Reach	1490 nm	9 micron SMF	80 km (49.71 miles)

**Table 9** *Single-Mode Fiber SFP Port Cabling Specifications (continued)*

<b>SFP</b>	<b>Transmit Wavelength<sup>1</sup></b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-SE-622-1510 Long Reach	1510 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1530 Long Reach	1530 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1550 Long Reach	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1570 Long Reach	1570 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1590 Long Reach	1590 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-622-1610 Long Reach	1610 nm	9 micron SMF	80 km (49.71 miles)
ONS-SI-GE-ZX	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-GE-ZX	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SE-ZE-EL	RJ45 cable	NA	NA

1. Typical loss on a 1310 nm wavelength SMF is 0.6 dB/km.
2. ONS-SC-2G-xx.x cable distance varies depending on DWDM system installation.

**Table 10** *Multimode Fiber SFP Port Cabling Specifications*

<b>SFP</b>	<b>Wavelength</b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-SE-4G-MM=	830 – 860 nm	62.5 micron MMF	300 m (1584 ft)
		50.0 micron MMF	500 m (1640 ft)
ONS-SE-100-FX=	1270 – 1380 nm	MMF	2 km (1.24 miles)
ONS-SE-100-LX10=	1260 – 1360 nm	MMF	15 km (9.32 miles)
15454-SFP-LC-SX=/ 15454E-SFP-LC-SX= Short Reach	850 nm	62.5 micron MMF	220 m (722 ft) 275 m (902 ft)
		50.0 micron MMF	500 m (1640 ft) 550 m (1804 ft)
15454-SFP-LC-LX=/ 15454E-SFP-LC-LX= Long Reach	1310 nm	62.5 micron MMF	550 m (1804 ft)
		50.0 micron MMF	550 m (1804 ft)
15454-SFP-200=/ 15454E-SFP-200= Long Reach	1310 nm	62.5 micron MMF	2 km (1.2 miles)
ONS-SE-200-MM=	1310 nm	62.5 micron MMF	2 km (1.2 miles)

**Table 10**      **Multimode Fiber SFP Port Cabling Specifications (continued)**

SFP	Wavelength	Fiber Type	Cable Distance
15454-SFP-GEFC-SX= 15454E-SFP-GEFC-S= Short Reach	850 nm	62.5 micron MMF	300 m (984 ft) for FC 1 Gbps and GE
			150 m (492 ft) for FC 2 Gbps
		50.0 micron MMF	550 m (1804 ft) for FC 1 Gbps and GE
			300 m (984 ft) for FC 2 Gbps
ONS-SI-155-SR-MM= Intermediate Reach	1310 nm	62.5/125 micron MMF	2 km (1.2 miles)
ONS-SI-622-SR-MM= Intermediate Reach	1310 nm	62.5/125 micron MMF	2 km (1.2 miles)

## XFP Description and Specifications

The 10 Gbps 1310 nm XFP transceiver is an integrated fiber optic transceiver that provides high-speed serial link at the following signaling rates: 9.95 Gbps, 10.31 Gbps, 10.51 Gbps, and 10.66/10.71/11.10 Gbps. These rates apply to 10GBASE-LR (Fibre Channel and Ethernet) as well as OC-192/STM-64 SONET/SDH. The XFP integrates the receiver and transmit path. The transmit side recovers and retimes the 10 Gbps serial data and passes it to a laser driver. The laser driver biases and modulates a 1310 nm DFB (distributed feedback) laser, enabling data transmission over SMF through an LC connector. The receive side recovers and retimes the 10 Gbps optical data stream from a positive-intrinsic-negative (PIN) photo detector, transimpedance amplifier and passes it to an output driver.

The XFP module uses the bail clasp latching mechanism as shown unlatched in [Figure 8](#) and latched in [Figure 9](#). See the label on the XFP for technology type and model.

XFP dimensions are:

- Height 0.33 inches (8.5 mm)
- Width 0.72 inches (18.3 mm)
- Depth 3.1 inches (78 mm)

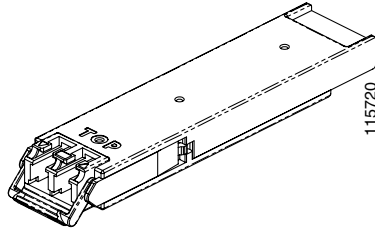
XFP temperature ranges are:

- COM—Commercial operating temperature range between 23 degrees Fahrenheit to 158 degrees Fahrenheit (–5 degrees Celsius to 70 degrees Celsius)
- EXT—Extended operating temperature range between 23 degrees Fahrenheit to 185 degrees Fahrenheit (–5 degrees Celsius to 85 degrees Celsius)
- IND—Industrial operating temperature range between –40 degrees Fahrenheit to 185 degrees Fahrenheit (–40 degrees Celsius to 85 degrees Celsius)

**Caution**

Do not add labels or markings to the XFPs.

**Figure 8** *Bail Clasp XFP (Unlatched)*



**Figure 9** *Bail Clasp XFP (Latched)*

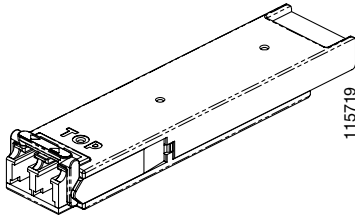


Table 11 lists specifications for available XFPs.

**Table 11** *XFP Specifications*

XFP	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-XC-10G-S1=	OC-192/STM64 10GE/10GFC	-6 to -1 -8.2 to +0.5	-11 to -1 -14.4 to +0.5
ONS-XC-10G-I2=	OC-192/STM-64	-1 to +2	-14 to +2
ONS-XC-10G-L2=	OC-192/STM-64	0 to +4	-24 to -7
ONS-XC-10G-30.3=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-31.1=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-31.9=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-32.6=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-33.4	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-34.2=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-35.0=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-SC-2G-35.8=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-36.6=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-37.4=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-38.1=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-38.9=	OC-192/STM-64/10GE	-1 to +3	-23 to -7



**Table 11** XFP Specifications (continued)

<b>XFP</b>	<b>Interface</b>	<b>Transmitter Output Power Min/Max (dBm)</b>	<b>Receiver Input Power Min/Max (dBm)</b>
ONS-XC-10G-39.7=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-40.5=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-41.3=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-42.1=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-42.9=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-43.7=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-44.5=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-45.3=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-46.1=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-46.9=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-47.7=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-48.5=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-49.3=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-50.1=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-50.9=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-51.7=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-52.5=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-53.3=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-54.1=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-54.9=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-55.7=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-56.5=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-57.3=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-58.1=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-58.9=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-59.7=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-60.6=	OC-192/STM-64/10GE	-1 to +3	-23 to -7
ONS-XC-10G-61.4=	OC-192/STM-64/10GE	-1 to +3	-23 to -7

## XFP Port Cabling Specifications

Table 12 lists specifications for XFP port cabling.

**Table 12**      **Single-Mode Fiber XFP Port Cabling Specifications**

<b>XFP</b>	<b>Wavelength</b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-XC-10G-S1=	1310 nm	SMF	10 km (6.2 miles) for 10GE/10GFC 2 km (1.2 miles) for OC-192/STM64
ONS-XC-10G-I2=	Transmitter: 1530 nm to 1565 nm Receiver: 1260 nm to 1565 nm	SMF	40 km (25.80 miles) for OC-192/STM64
ONS-XC-10G-L2=	Transmitter: 1530 nm to 1565 nm Receiver: 1260 nm to 1565 nm	SMF	80 km (49.71 miles) for OC-192/STM64
ONS-XC-10G-30.3=	1530.33 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-31.1=	1531.12 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-31.9=	1531.90 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-32.6=	1532.68 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-33.4	1533.47 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-34.2=	1534.25 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-35.0=	1535.04 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-SC-2G-35.8=	1535.82 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-36.6=	1536.61 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-37.4=	1537.40 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-38.1=	1538.19 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-38.9=	1538.98 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-39.7=	1539.77 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-40.5=	1540.56 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-41.3=	1541.35 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE

**Table 12**      **Single-Mode Fiber XFP Port Cabling Specifications (continued)**

<b>XFP</b>	<b>Wavelength</b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-XC-10G-42.1=	1542.14 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-42.9=	1542.94 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-43.7=	1543.73 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-44.5=	1544.53 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-45.3=	1545.32 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-46.1=	1546.12 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-46.9=	1546.92 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-47.7=	1547.72 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-48.5=	1548.51 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-49.3=	1549.32 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-50.1=	1550.12 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-50.9=	1550.92 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-51.7=	1551.72 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-52.5=	1552.52 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-53.3=	1553.33 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-54.1=	1554.13 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-54.9=	1554.94 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-55.7=	1555.75 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-56.5=	1556.55 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-57.3=	1557.36 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-58.1=	1558.17 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE

**Table 12**      *Single-Mode Fiber XFP Port Cabling Specifications (continued)*

<b>XFP</b>	<b>Wavelength</b>	<b>Fiber Type</b>	<b>Cable Distance</b>
ONS-XC-10G-58.9=	1558.98 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-59.7=	1559.79 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-60.6=	1560.61 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE
ONS-XC-10G-61.4=	1561.43 nm	SMF	80 km (49.71 miles) for OC-192/STM64/10GE

## GBIC, SFP and XFP Installation and Removal

This section provides installation and removal procedures for GBICs and SFPs/XFPs. Because GBICs and SFPs/XFPs are hot-swappable, they can be installed and removed while the card/shelf assembly is powered and running.



**Warning**

**GBICs and SFPs/XFPs are Class I laser products.** Statement 1008



**Warning**

**Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm could pose an eye hazard.** Statement 1056



**Warning**

**Ultimate disposal of this product should be handled according to all national laws and regulations.**



**Warning**

**During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**



**Warning**

**Before you install, operate, or service the system, read the Site Preparation and Safety Guide. This guide contains important safety information you should know before working with the system.**



**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**



**Warning**

**To comply with the Telcordia GR-1089 Network Equipment Building Systems (NEBS) standard for electromagnetic compatibility and safety, connect the copper Ethernet ports to intrabuilding or nonexposed wiring and cabling only.**

**Warning**

**Connect only shielded cables to electrical Ethernet interfaces.**

**Warning**

**Cables must be grounded on both connection sides.**

**Caution**

Do not use GBICs or SFPs/XFPs from third-party vendors. Cisco TAC does not support third-party vendor GBICs or SFPs/XFPs. A third-party vendor GBIC or SFP/XFP is any GBIC or SFP/XFP module that is not sourced from Cisco directly, or via a Cisco Partner, or Cisco authorized seller. Cisco-sourced GBICs and SFPs/XFPs can be identified by the Cisco label and logo.

**Note**

GBICs and SFPs must be matched on either end by type: SX to SX, LX/LH to LX/LH, or ZX to ZX (GBIC).

**Note**

The shelf should be equipped with a CC-FAN if the copper SFP is installed on a MXP\_MR\_10DME card.

## Installing a GBIC or SFP/XFP

Prior to installing an SFP, verify that the SFP is the correct type for your network and that you are installing compatible SFPs, for example, SX to SX or LX/LH to LX/LH.

**Note**

G-Series cards manufactured before August 2003 do not support DWDM GBICs. G1K-4 cards compatible with DWDM GBICs have a CLEI code of WM5IRWPCAA.

**Note**

All versions of G1K-4 cards support CWDM GBICs.

**Note**

GBICs, SFPs, and XFPs are hot-swappable and can therefore be installed/removed while the card/shelf assembly is powered and running.

**Step 1** Remove the GBIC, SFP, or XFP from its protective packaging.

**Step 2** Check the label to verify that the GBIC, SFP, or XFP is the correct type for your network.

[Table 1 on page 2](#) shows the available GBICs, SFPs, and XFPs.

**Note**

The GBICs are very similar in appearance. Check the GBIC label carefully before installing it.

**Note**

Before you install SFPs on the MRC-2.5G-4/MRC-12 card, refer to the MRC2.5G-4/MRC-12 card information in the *Cisco ONS 15454 Reference Manual* for bandwidth restrictions based on the port where you install the SFP and the cross-connect card being used.

**Step 3** Verify the type of GBIC, SFP, or XFP you are using:

- If you are using a GBIC with clips, go to [Step 4](#).
- If you are using a GBIC with a handle, go to [Step 5](#).
- If you are using an SFP or XFP, go to [Step 6](#).

**Step 4** For GBICs with clips:

- a. Grip the sides of the GBIC with your thumb and forefinger and insert the GBIC into the slot on the card.

**Note**

GBICs are keyed to prevent incorrect installation.

- b. Slide the GBIC through the flap that covers the opening until you hear a click. The click indicates the GBIC is locked into the slot.
- c. When you are ready to attach the network fiber-optic cable, remove the protective plug from the GBIC, save the plug for future use, then plug the fiber connector into the GBIC.

**Step 5** For GBICs with a handle:

- a. Remove the protective plug from the SC-type connector.
- b. Grip the sides of the GBIC with your thumb and forefinger and insert the GBIC into the slot on the card.
- c. Lock the GBIC into place by closing the handle down. The handle is in the correct closed position when it does not obstruct access to an SC-type connector.
- d. Slide the GBIC through the cover flap until you hear a click.  
The click indicates that the GBIC is locked into the slot.
- e. When you are ready to attach the network fiber-optic cable, see the [“Connecting Single-Mode and Multimode Optical Fiber” section on page 31](#).

**Step 6** For SFPs and XFPs:

- a. Plug the LC duplex connector of the fiber into a Cisco-supported SFP or XFP.
- b. If the new SFP or XFP has a latch, close the latch over the cable to secure it.
- c. Plug the cabled SFP or XFP into the card port until it clicks. See the [“Connecting Single-Mode and Multimode Optical Fiber” section on page 31](#) for more information.

SFPs and XFPs must be provisioned in CTC. If you install a multirate PPM, complete the “Provision a PPM” task in the Cisco ONS procedure guide for the applicable platform. (Single-rate XFPs do not need to be provisioned in CTC.)

## Connecting Single-Mode and Multimode Optical Fiber

Attach the appropriate optical fiber cable directly to the SC-type receptacle on the GBIC or the LC-type connector on the SFP/XFP. You can use either simplex or duplex connectors for most devices. For simplex connectors, two cables are required, one cable for transmit (Tx) and a second cable for receive (Rx). For duplex connectors, only one cable that has both Tx and Rx connectors is required.

- 
- Step 1** Remove the protective plugs from the GBIC or SFP/XFP and save them for future use.
  - Step 2** Remove the protective caps from the connectors on the fiber-optic cable and save them for future use.
  - Step 3** Clean fiber-optic connectors on fiber-optic cables.
  - Step 4** Plug the fiber-optic cable into the SC-type receptacle on the GBIC or the LC-type connector on the SFP/XFP.
- 

## Preprovisioning an SFP or XFP Slot

This procedure preprovisions SFPs and XFPs. SFPs and XFPs are referred to as pluggable port modules (PPMs) in CTC. Prior to performing this procedure, make sure you have logged into CTC.



### Note

SFPs and XFPs are generically called PPMs in CTC. After installing multirate SFPs or XFPs, multirate PPMs must be provisioned in CTC. To complete the provisioning of the pluggable port, complete the [“Provisioning a Multirate PPM” task on page 32](#).

- 
- Step 1** In node view (single-shelf mode) or shelf view (multishelf mode), double-click the card where you want to provision PPM settings.
  - Step 2** Click the **Provisioning > Pluggable Port Modules** tabs.
  - Step 3** In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.
  - Step 4** In the Create PPM dialog box, complete the following:
    - PPM—Choose the slot number where the SFP or XFP is installed from the drop-down list.
    - PPM Type—Choose the number of ports supported by your SFP or XFP from the drop-down list. The drop-down list displays the number of PPMs that are available for provisioning. If only one port is supported, **PPM (1 port)** is the only option.
  - Step 5** Click **OK**. The newly created port appears in the Pluggable Port Modules pane. The row in the Pluggable Port Modules pane turns light blue. The Actual Equipment Type column remains blank until the actual SFP or XFP is installed. After the SFP or XFP is installed, the row in the pane turns white and the Actual Equipment Type column shows the equipment name.
  - Step 6** Verify that the PPM appears on the list in the Pluggable Port Modules pane. If it does not, repeat Steps [3](#) through [5](#).
  - Step 7** Repeat [Step 2](#) to provision a second PPM, if needed. If not, continue with [Step 8](#).
  - Step 8** Click **OK**.
-

## Provisioning a Multirate PPM

This task provisions a multirate PPM. Prior to performing this procedure, make sure you have logged into CTC.



### Note

If the PPM was preprovisioned using the [“Preprovisioning an SFP or XFP Slot” task on page 31](#), this task is unnecessary, unless the PPM has an Out-of-Service and Autonomous Management, Unassigned (OOS-AUMA,UAS) (ANSI) or Unlocked-disabled, unassigned (ETSI) service state.

- 
- Step 1** In node view (single-shelf mode) or shelf view (multishelf view), double-click the card where you want to provision PPM settings.
- Step 2** If this is the first PPM provisioned for the card, complete the following steps. If not, continue with [Step 3](#).
- Click the **Provisioning > Line > SONET** (ANSI) or **SDH** (ETSI) tabs.
  - Locate the Trunk port table row and verify that the Service State column value is OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI). If yes, continue with [Step 3](#). If not, continue with [Step c](#).
  - Click the **Admin State** table cell and choose **OOS,MT** (ANSI) or **Locked,Maintenance**.
  - Click **Apply**, then **Yes**.
- Step 3** Click the **Provisioning > Pluggable Port Modules** tabs.
- Step 4** In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.
- Step 5** In the Create PPM dialog box, complete the following:
- PPM—Choose the slot number where the SFP is installed from the drop-down list.
  - PPM Type—Choose the number of ports supported by your SFP from the drop-down list. If only one port is supported, **PPM (1 port)** is the only option.
- Step 6** Click **OK**. The newly created port appears in the Pluggable Port Modules area. The row in the Pluggable Port Modules area turns white and the Actual Equipment Type column lists the equipment name.
- Step 7** If you want to provision a PPM on another port, repeat Steps [3](#) through [5](#).
- 

## Removing a GBIC or SFP/XFP

- 
- Step 1** Disconnect the network fiber cable from the GBIC SC connector or the SFP/XFP LC duplex connector. If the SFP/XFP connector has a latch securing the fiber cable, pull it upward to release the cable.
- Step 2** If you are using a GBIC with clips:
- Release the GBIC from the slot by squeezing the two plastic tabs on each side of the GBIC.
  - Slide the GBIC out of the slot. A flap closes over the slot to protect the connector on the Gigabit Ethernet card.
- Step 3** If you are using a GBIC with a handle:
- Release the GBIC by opening the handle.
  - Pull the handle of the GBIC.



- c. Slide the GBIC out of the slot. A flap closes over the slot to protect the connector on the Gigabit Ethernet card.

**Step 4** If you are using an SFP/XFP:

- a. If the SFP/XFP connector has a latch securing the fiber cable, pull it upward to release the cable.
  - b. Pull the fiber cable straight out of the connector.
  - c. Unplug the SFP/XFP connector and fiber from the card.
  - d. Slide the SFP/XFP out of the slot.
- 

## Related Documentation

Use the *Installing the GBIC, SFP and XFP Optics Modules in Cisco ONS Platforms* spare document in conjunction with the following referenced publications as needed:

- Cisco ONS 15454 Procedure Guide
- *Cisco ONS 15454 Reference Manual*
- *Cisco ONS 15454 Troubleshooting Guide*
- Cisco ONS 15454 SDH Procedure Guide
- *Cisco ONS 15454 SDH Reference Manual*
- *Cisco ONS 15454 SDH Troubleshooting Guide*
- Cisco ONS 15454 DWDM Procedure Guide
- *Cisco ONS 15454 DWDM Reference Manual*
- *Cisco ONS 15454 DWDM Troubleshooting Guide*
- Cisco ONS 15600 Procedure Guide
- *Cisco ONS 15600 Reference Manual*
- *Cisco ONS 15600 Troubleshooting Guide*
- *Cisco ONS 15310-CL and Cisco ONS 15310-MA Procedure Guide*
- *Cisco ONS 15310-CL and Cisco ONS 15310-MA Reference Manual*
- *Cisco ONS 15310-CL and Cisco ONS 15310-MA Troubleshooting Guide*

## Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

### Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/techsupport>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

[http://www.cisco.com/public/countries\\_languages.shtml](http://www.cisco.com/public/countries_languages.shtml)

## Product Documentation DVD

Cisco documentation and additional literature are available in the Product Documentation DVD package, which may have been shipped with your product. The Product Documentation DVD is updated regularly and may be more current than printed documentation.

The Product Documentation DVD is a comprehensive library of technical product documentation on portable media. The DVD enables you to access multiple versions of hardware and software installation, configuration, and command guides for Cisco products and to view technical documentation in HTML. With the DVD, you have access to the same documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .pdf versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD=) from Cisco Marketplace at this URL:

<http://www.cisco.com/go/marketplace/>

## Cisco Optical Networking Product Documentation CD-ROM

Optical networking-related documentation, including Cisco ONS 15xxx product documentation, is available in a CD-ROM package that ships with your product. The Optical Networking Product Documentation CD-ROM is updated periodically and may be more current than the printed documentation.

## Ordering Documentation

Beginning June 30, 2005, registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

<http://www.cisco.com/go/marketplace/>

Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at [tech-doc-store-mkpl@external.cisco.com](mailto:tech-doc-store-mkpl@external.cisco.com) or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

## Documentation Feedback

You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can send comments about Cisco documentation to [bug-doc@cisco.com](mailto:bug-doc@cisco.com).

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems  
Attn: Customer Document Ordering  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

## Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

[http://www.cisco.com/en/US/products/products\\_security\\_vulnerability\\_policy.html](http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html)

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

[http://www.cisco.com/en/US/products/products\\_psirt\\_rss\\_feed.html](http://www.cisco.com/en/US/products/products_psirt_rss_feed.html)

## Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—[security-alert@cisco.com](mailto:security-alert@cisco.com)

An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies—[psirt@cisco.com](mailto:psirt@cisco.com)

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532



**Tip**

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page

at this URL:

[http://www.cisco.com/en/US/products/products\\_security\\_vulnerability\\_policy.html](http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html)

The link on this page has the current PGP key ID in use.

---

## Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

## Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>



Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

---

## Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

## Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

**Severity 1 (S1)**—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

**Severity 2 (S2)**—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

**Severity 3 (S3)**—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

**Severity 4 (S4)**—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

## Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:  
<http://www.cisco.com/go/marketplace/>
- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

<http://www.cisco.com/packet>

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

or view the digital edition at this URL:

<http://ciscoiq.texterity.com/ciscoiq/sample/>

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

<http://www.cisco.com/ipj>

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

<http://www.cisco.com/en/US/products/index.html>

- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

<http://www.cisco.com/discuss/networking>

- World-class networking training is available from Cisco. You can view current offerings at this URL:

<http://www.cisco.com/en/US/learning/index.html>

This document is to be used in conjunction with the documents listed in the “[Related Documentation](#)” section.

CCVP, the Cisco logo, and Welcome to the Human Network are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn is a service mark of Cisco Systems, Inc.; and Access Registrar, Aironet, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, iQuick Study, LightStream, Linksys, MeetingPlace, MGX, Networkers, Networking Academy, Network Registrar, PIX, ProConnect, ScriptShare, SMARTnet, StackWise, The Fastest Way to Increase Your Internet Quotient, and TransPath are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0711R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.

© 2007 Cisco Systems, Inc. All rights reserved.